2000

Baseline Assessment of the Use of a Small Missouri River Backwater by Fish at Ponca State Park in Dixon County, Nebraska

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Prepared By
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INTRODUCTION

Ponca State Park is located adjacent to the Missouri River near the town of Ponca in Dixon County, Nebraska between river miles 753.8 and 755.3. This portion of the river is a 59-mile, unchannelized segment that has been designated as the Missouri National Recreational River under the Wild and Scenic Rivers Act. The majority of the park is situated high on bluffs that overlook the Missouri River. Until recently, the park had only a small amount of easily accessible river frontage. In 1999, the Nebraska Game and Parks Commission (NGPC) acquired an additional 295 acres of river bottomland on the adjacent land to the north of Ponca State Park. This land, which is made up of abandoned river chutes, floodplain forest, grasslands, wetlands and a backwater, has now been added to the total acreage of the park. Since this land was added to the park, The NGPC has asked the U.S. Army Corps of Engineers (Corps) to consider joining into a cost share partnership to restore this bottomland under Missouri National Recreational River authority. This would be accomplished by following the business process used for the Section 1135 Aquatic Habitat Restoration Program. This program involves a 75% federal 25% non-federal cost share agreement in which the total cost of the project cannot exceed 5 million dollars and the cost share sponsor must acquire all necessary real estate for the project.

A preliminary restoration plan was developed for the property during the summer and fall of 2000. Under this plan, approximately 2 miles of backwater and shallow water habitat of varying depths would be excavated and connected to the river at the location of the existing backwater. A portion of this backwater area would be excavated to a depth greater than 10 feet in order to create off-channel overwintering habitat for fish. In addition, the fingers of the existing backwater area would be expanded, and several wetland depressions would be excavated within an adjacent high diversity native grass planting to create wet meadow habitat. Figure 1 in Appendix A shows a conceptual drawing of the proposed restoration features developed in the preliminary restoration plan. One of the primary benefits of the backwater restoration work at the park would be to increase the amount of shallow, slack water habitat for fish, and perhaps reconnect the Missouri River to a small amount of its historic floodplain. The created habitat should provide valuable spawning, rearing, and foraging habitat, as well as some deep-water overwintering habitat for a number of native riverine fish species.

Prior to beginning detailed design and construction on a restoration project such as this, it is necessary to gather baseline biological data. This data is necessary to determine the quality of the existing habitat, and to find out what species are utilizing this habitat prior to restoration activities. This data then serves as a baseline to be measured against post-construction data in order to measure the outputs of the restoration project. For this reason, personnel of the U.S. Army Corps of Engineers, with the assistance of the Ponca State Park Superintendent, collected baseline fishery data in the existing backwater located at the northern end of the newly acquired property on October 5, 2000.

MATERIALS AND METHODS

The fish survey was conducted using two types of collecting gear. This gear included 3 experimental gill nets and a bag seine. All three gill nets were 33 meters long and 1.5 meters deep. The nets were constructed of monofilament with mesh sizes of 2.54 cm, 3.18 cm, 5.08, and 6.35 cm. Mesh sizes changed horizontally along the nets. The bag seine was 6.66 meters long and 1.33 meters deep, and had a 1.3 x 1.3 meter bag. The net was constructed out of ¼ inch nylon mesh.

Sampling was conducted in four different locations in the backwater area (Fingers A, B, and C, and the mouth). Gill nets were placed perpendicular to the shoreline across the mouths of fingers B and C and the mouth of the of the main backwater area where it opens into the Missouri River. Due to time constraints, the gill nets were only left in place for 4 hours. Figure 2 in Appendix A is an aerial photograph showing the sampling locations. Figure 3 in Appendix A is a topographic map of the newly acquired bottomland at Ponca State Park.

Seining was performed in each of the three fingers (A, B, and C) of the backwater area. Water in the three fingers ranged from 6 inches to 3 feet in depth. Each finger was sampled with a series of short seine hauls until a majority of the finger was sampled. No seining was performed in the main portion of the backwater, because the water was too deep (6 to 8 feet) in this area. The majority of fish captured, and representatives of every species captured were kept for later identification in the lab. However, representatives of some of the species most commonly captured during this sampling effort were released. The majority of the fish released were representatives of any one of three common species (*Carpiodes carpio, Lepomis cyanellus*, and *Notropis atherinoides*). Figure 2 depicts the locations of each sampling area. Because the fingers were not thoroughly sampled due to time constraints, the size of the fingers, and the fact that some of the fish most frequently caught were released, data collected from the seine can only be used qualitatively. No quantitative conclusions can be made based on the results of the samples collected with the seine.

Most of the fish collected with the bag seine were preserved in 10% formalin solution. These fish will eventually be transferred to a 70% ethanol solution for final preservation and storage. They are currently being stored in the Ichthyology Lab at UNO. Fish collected with the gill nets were identified to species and recorded in the field. Representatives of each species were photographed and then released. Photographs were also taken of the sampling locations and some of the equipment used in the study (Appendix C).

RESULTS AND DISCUSSION

Overall, 19 species of fish were identified from a total of 273 fish collected during this sampling effort (see Table 1 in Appendix B). The most abundant species collected in the backwater was *Carpiodes carpio*, followed by *Notropis atherinoides*. The large

numbers of small fish captured with the bag seine seem to suggest that the backwater serves as an important nursery area for a number of fish species. The majority of the fish collected with the seine were collected in Finger A. Finger A is a very long, narrow, and shallow finger with a lot of dense emergent vegetation along the fringes. There was also a very dense carpet of filamentous algae in parts of this finger. All of the *Lepomis cyanellus* (12) and *Etheostoma exile* (15) specimens were captured in these areas with a carpet of filamentous algae and the fringes surrounded with cattails. This portion of the finger also had water flowing upstream, in the opposite direction of the river, on the day we sampled. Table 2 in Appendix B shows the number of species collected with the bag seine per sampling site.

Eight different species were collected with the gill nets (see Table 3 in Appendix B). All but three of the species collected were large piscivorous fish. The two species most often captured were *Stizostedion canadense,* and *Hiodon alosoides.* The highest number of fish collected with the gill nets (21) occurred at the mouth of the backwater. Most of the fish collected at the mouth of the backwater had their heads facing into the backwater. This seems to suggest that large fish enter the backwater from the main river channel to forage on the abundant invertebrates, small fish, and plankton living in these productive, sheltered waters.

The results of this brief sampling effort indicate that the existing backwater at Ponca State Park is a valuable and highly productive nursery and foraging area for native Missouri River Fish. Undoubtedly, if time was not a factor in this sampling effort, and the gill nets were left in place over night, a significantly larger number of fish and perhaps a few more species would have been collected. If the proposed addition of approximately 2 miles of similar connected backwater habitat is successful, the newly created habitat would add a significant amount of productivity and habitat diversity to this somewhat degraded portion of the Missouri River. In order to measure the value of the restored habitat, post-construction follow-up surveys should be conducted in the 1st, 3rd, 5th, and 10th years after construction is complete. Future sampling efforts should also include the use of fyke (hoop) nets, to increase the chances of capturing all species present, as well as larval fish sampling gear in order to better determine the value of the restored habitat as a nursery area.

APPENDIX A

FIGURES

Figure 1

PONCA STATE PARK RESTORATION PROJECT

IMAGERY BASED ON C.I.R. PHOTOGRAPHY
DATE OF PHOTOGRAPHY: 4 MAY 1998

GAVINS POINT DAM RELEASE DATA
4 MAY 1998: 26,000 C.F.S.

APPROX SCALE:
1" = 1000'

1000 0 1000 2000 Feet

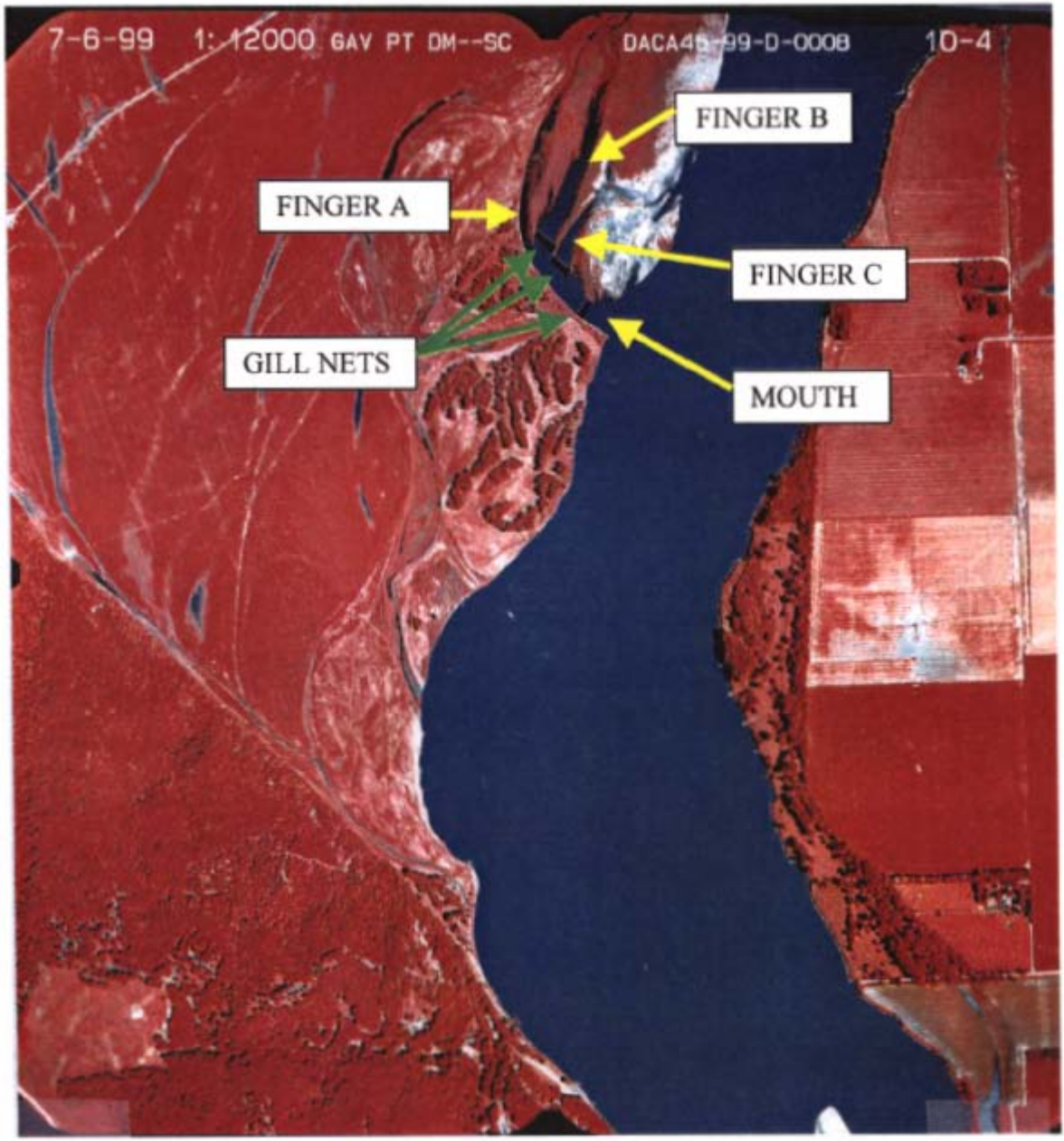


Figure 2

Aerial photograph showing newly acquired bottomland and sampling sites.

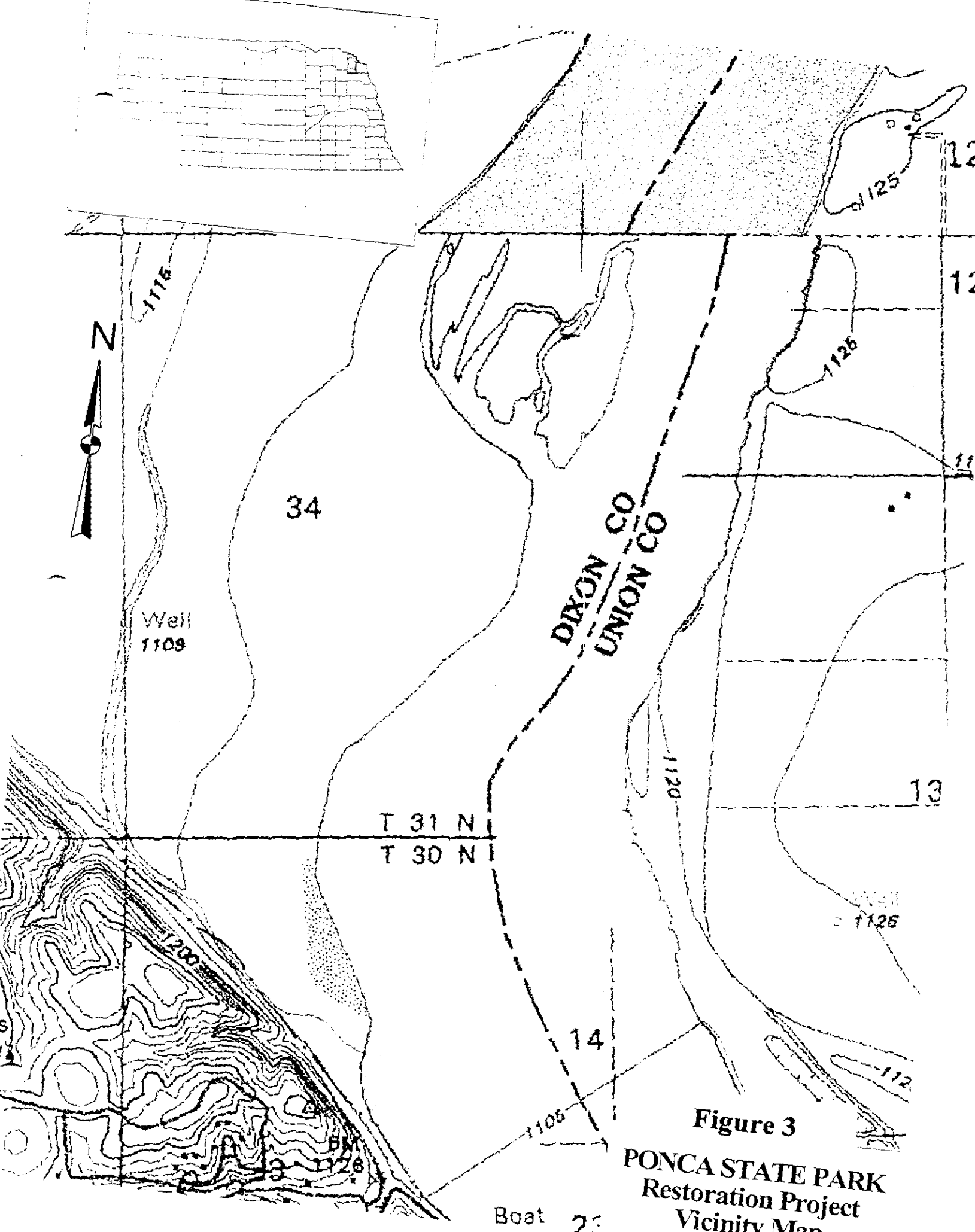


Figure 3

PONCA STATE PARK
Restoration Project
Vicinity Map

APPENDIX B

TABLES

Table 1
Total Species Collected at all Sampling Sites With all Methods

SPECIES	SEINE	GILL NET	TOTAL
1. *Lepomis cyanellus* (green sunfish)	12		12
2. *Stizostedion canadense* (sauger)		9	9
3. *Stizostedion vitreum* (walleye)		3	3
4. *Esox lucius* (northern pike)		2	2
5. *Lepisosteus platostomus* (shortnose gar)		2	2
6. *Hiodon alosoides* (goldeye)		6	6
7. *Dorosoma cepedianum* (gizzard shad)	9	2	11
8. *Cyprinus carpio* (common carp)	1	1	2
9. *Carpiodes cyprinus* (quillback)	9	5	14
10. *Carpiodes carpio* (river carpsucker)	96		96
11. *Ictiobus bubalus* (smallmouth buffalo)	1		1
12. *Etheostoma exile* (Iowa darter)	15		15
13. *Noturus gyrinus* (tadpole madtom)	1		1
14. *Ameiurus melas* (black bullhead)	4		4
15. *Pimephales promelas* (fathead minnow)	20		20
16. *Cyprinella spiloptera* (spotfin shiner)	11		11
17. *Notropis atherinoides* (emerald shiner)	59		59
18. *Notropis stramineus* (sand shiner)	3		3
19. *Notropis dorsalis* (bigmouth shiner)	2		2
Total	243	30	273

Table 2
Number of Species Collected With Seine by Sampling Location

SPECIES	FINGER A	FINGER B	FINGER C
1. *Lepomis cyanellus*	12		
2. *Dorosoma cepedianum*	2	4	3
3. *Cyprinus carpio*	1		
4. *Carpiodes cyprinus*	9		
5. *Carpiodes carpio*	95	1	
6. *Ictiobus bubalus*		1	
7. *Etheostoma exile*	15		
8. *Noturus gyrinus*	1		
9. *Ameiurus melas*	4		
10. *Pimephales promelas*	19	1	
11. *Cyprinella spiloptera*	6		5
12. *Notropis atherinoides*	8	34	17
13. *Notropis stramineus*	3		
14. *Notropis dorsalis*	2		
Total	177	41	25

Table 3
Number of Species Collected With Gill Net by Sampling Location

SPECIES	FINGER B	FINGER C	MOUTH	TOTAL
1. *Stizostedion canadense*	2	2	5	9
2. *Stizostedion vitreum*		1	2	3
3. *Esox lucius*		1	1	2
4. *Lepisosteus platostomus*			2	2
5. *Hiodon alosoides*			6	6
6. *Dorosoma cepedianum*	1		1	2
7. *Cyprinus carpio*	1			1
8. *Carpiodes cyprinus*		1	4	5
Total	4	5	21	30

APPENDIX C

PHOTOGRAPHS

View looking southeast at main body of backwater and the opening to the Missouri River

View looking northwest at the junction of Finger A and Finger B.

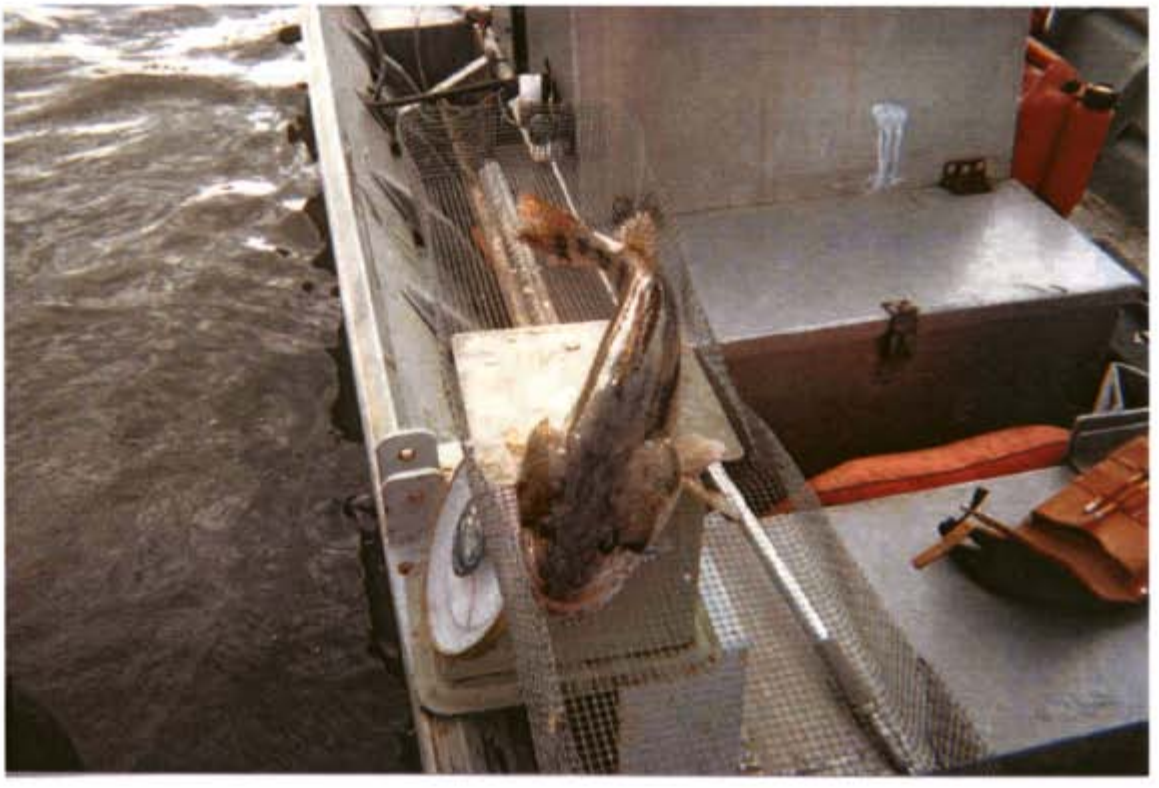
Hiodon alosoides (goldeye) captured with a gill net at the mouth of the backwater.

Carpiodes cyprinus (quillback) captured with a gill net at the mouth of the backwater.

Lepisosteus platostomus (short-nosed gar) captured with a gill net at the mouth of the backwater.

Esox lucius (northern pike) captured with a gill net in Finger B.

Esox lucius (northern pike) captured with a gill net at the mouth of the backwater.



Stizostedion canadense (sauger) captured with a gill net at the mouth of the backwater.

Stizostedion canadense (sauger) captured with a gill net at the mouth of the backwater.

Stizostedion vitreum (walleye) captured with a gill net at the mouth of the backwater.